PMOC REPORT

OP 38 – Rail Vehicle Technical Review

Honolulu High-Capacity Transit Corridor Project
City and County of Honolulu
Honolulu, HI

October 2011 (FINAL)

PMOC Contract Number: DTFT60-09-D-00012
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Length of Time Assigned: Five Years (November 18, 2009 through November 17, 2014)

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1.0 EXECUTIVE SUMMARY

The City and County of Honolulu ("grantee") has embarked on the design and construction of a regional 20-mile, double tracked, elevated, and fully automated rail transit system known as the Honolulu High-Capacity Transit Corridor Project (Project), serving the metropolitan Honolulu area. The grantee expects to open the first segment of the system in 2015 with the entire line in operation by 2019. The grantee is preparing a request to enter into Final Design (FD).

Currently, the grantee is proceeding with awards of several Design-Build (DB) and Design-Build-Operate-Maintain (DBOM) contracts in support of this effort; one such contract is for the Core Systems Contractor (CSC). This contract is quite comprehensive, as it includes design and supply of vehicles, traction power, automatic train control, fare collection and communications for the system as well as operation and maintenance of the systems equipment and the vehicle fleet during the activation of the system and revenue service for ten years or more after opening. The grantee received proposals for the CSC contract and is in the process of awarding the CSC contract to Ansaldo Honolulu JV (Ansaldo), which includes AnsaldoBreda (AB) as the vehicle supplier. To meet the demand as required by the grantee in the CSC RFP, Ansaldo has proposed supplying 80 "Light Metro" vehicles for the Project at a total cost of $180.1 million.

At the request of Federal Transit Administration (FTA), the Jacobs Engineering Group, Inc. (Jacobs) Project Management Oversight Contractor (PMOC) performed a review of the **CSC Request for Proposal (RFP) through Amendment 44**, as part of the ongoing effort of Jacobs PMOC team's oversight responsibility for the Project as related to the FTA's grant process. The PMOC was also provided Ansaldo's **Best and Final Offer 2 (BAFO), dated February 2011** as a supplemental document that offered additional details related to the RFP requirements.

The PMOC utilized FTA Oversight Procedure (OP) 38, titled "Bus and Rail Technical Review," to perform the review of the HHCTCP CSC DBOM contract RFP Package. The PMOC conducted a review of the RFP to assess its compliance with the OP 38 requirements; the review was limited to contents of the rail vehicle RFP technical and commercial provisions and Ansaldo's BAFO documents related to the vehicle portion of the contract. These consisted of Ansaldo's commercial terms and conditions and technical specifications for the proposed vehicle from vehicle supplier AnsaldoBreda.

The OP 38 Scope of Work cites several other documents such as Contract Data Requirements List (CDRL) items, Test Program Plan, Design Documents, Quality Assurance, etc., which will require review upon issuance of the Notice-to-Proceed (NTP) to the CSC and during the vehicle contract execution.

Per OP 38 Section 7.0 reporting requirements, PMOC's review findings, comments, conclusions and recommendations are presented in this report and in the following appendices:

- Appendix B: OP 38 APPENDIX B: Vehicle Technical Review Checklist – Grantee Compliance
- Appendix C: Technical Specification Review Summary

Upon review, it is PMOC's conclusion that this Rail Vehicle Procurement Package is acceptable as a deliverable in regard to the Project entry into Final Design, and that it meets the requirements of FTA OP 38, Sections 1.0, Purpose and 3.0 Objectives:

- The vehicles being procured are a good fit for the intended use and include appropriate technologies.
- The procurement is being performed in conformance with applicable regulations and guidance.

The vehicle portion of CSC RFP document is comprehensive and is structured for the ready accessing and referencing of operational and material requirements for the desired performance of the vehicle and sub-systems. The content provides the necessary information related to the grantee's commercial terms and conditions, Federal Regulations, procurement process, and vehicle technical requirements and standards. The PMOC's review of the technical specifications (summarized in Appendix C) found that they were comprehensive and satisfactory in addressing the rail vehicle requirements.

It should be noted that the PMOC has not been privy to the details of evaluation factors / ranking / rating and, therefore, cannot comment on the evaluation and selection procedure or ultimate selection decision. The grantee has agreed to provide the PMOC the grantee's detailed evaluation procedure for further review to assess comprehensiveness of the process. In addition, the unsuccessful proposers had filed protests for the CSC contract award to Ansaldo, which were resolved in the grantee's favor. The grantee is now proceeding with the contract execution with Ansaldo.

While the information as presented is acceptable as a deliverable for the grantee to enter into Final Design, PMOC's review offers several findings and comments on the grantee's RFP as well as on Ansaldo's BAFO that are summarized in Section 5.0. The PMOC suggests the grantee to take them under consideration to enhance its vehicle contract execution as the grantee proceeds with the CSC contract, including the rail vehicle procurement.

Additionally, upon NTP to the CSC and in order to fully conclude PMOC's scope of work obligations as stated in FTA OP 38, the PMOC recommends the following:

- Perform a follow-up review of The grantee's evaluation factors/ranking/rating of the vehicle manufacturer proposals to determine if reasonable and equitable decisions concerning the vehicles indeed represent good value for the product selected and meet specified requirements.
- Review the decision and final disposition of the protests for the CSC contract.
- Monitor the CSC/Vehicle procurement process to assess and assist the grantee in conducting this program in a timely manner.

In summary, the PMOC recommends that the Rail Vehicle Procurement Package be accepted as a Final Design deliverable.

The PMOC recommends that upon the NTP to CSC, and through the vehicle contract design & procurement process, the grantee provide a satisfactory resolution of PMOC's comments expressed in this Report and Appendix B titled OP 38 Appendix B, Rail Vehicle

Technical Review Checklist – Grantee Compliance, for a follow-up review by the PMOC.

2.0 INTRODUCTION

The City and County of Honolulu ("grantee") has embarked on the design and construction of a regional 20-mile, double tracked, elevated, and fully automated rail transit system known as the Honolulu High-Capacity Transit Corridor Project (Project), serving the metropolitan Honolulu area. The grantee expects to open the first segment of the system in 2015 with the entire line in operation by 2019. The grantee is preparing a request to enter into Final Design (FD).

Currently, the grantee is proceeding with awards of several Design-Build (DB) and Design-Build-Operate-Maintain (DBOM) contracts in support of this effort; one such contract is for the Core Systems Contractor (CSC). This contract is quite comprehensive, as it includes design and supply of vehicles, traction power, automatic train control, fare collection and communications for the system as well as operation and maintenance of the systems equipment and the vehicle fleet during the activation of the system and revenue service for ten years or more after opening. The grantee received proposals for the CSC contract and is in the process of awarding the CSC contract to Ansaldo Honolulu JV (Ansaldo), which includes AnsaldoBreda as the vehicle supplier. To meet the demand as required by the grantee in the CSC RFP, Ansaldo has proposed supplying 80 "Light Metro" vehicles for the Project at a total cost of $180.1 million.

3.0 PMOC REVIEW PROCESS

At the request of Federal Transit Administration (FTA), the Jacobs Engineering Group, Inc. (Jacobs) Project Management Oversight Contractor (PMOC) performed a review of the **CSC Request for Proposal (RFP) through Amendment 44**, as part of the ongoing effort of Jacobs PMOC team's oversight responsibility for the Project as related to the FTA's grant process. The PMOC was also provided Ansaldo's **Best and Final Offer 2 (BAFO), dated February 2011** as a supplemental document that offered additional details related to the RFP requirements.

The PMOC utilized FTA OP 38, titled "Bus and Rail Technical Review," to perform the review of the HHCTCP CSC DBOM contract Request for Proposal (RFP) Package. The PMOC conducted a review of the RFP to assess its compliance with the OP 38 requirements; it was limited to contents of the rail vehicle RFP technical and commercial provisions and Ansaldo's BAFO documents related to the vehicle portion of the contract. These consisted of Ansaldo's commercial terms and conditions and technical specifications for the proposed vehicle from Ansaldo's vehicle supplier, AnsaldoBreda.

The OP 38 Scope of Work cites several other documents such as Contract Data Requirements List (CDRL) items, Test Program Plan, Design Documents, Quality Assurance, etc. that will require review upon issuance of the Notice-to-Proceed (NTP) to the CSC and during the vehicle contract execution.

Specifically, the PMOC utilized the following documentation (primarily extracted from the CSC RFP and BAFO2 request, including RFP Amendments 1 through 44) in support of this review:

- General Conditions for Design Build
- Design Criteria, Section 12, dated October 2010
- Technical Provisions, TP 2, Verification Test and Acceptance
- Technical Provisions, TP 4, Passenger Vehicle Technical Provisions
- Special Provisions, 2a-SP-1.6, Federal Standards
- Special Provisions, SP 1-7 BAFO, dated December 2010
- Requests for Clarification, BAFO, dated December 2010
- AnsaldoHonoluluJV BAFO2, Proposed Vehicle, Sections 1 through 13
- AnsaldoHonoluluJV Design Build Price Proposal, Section B, dated February 24, 2011

Per OP 38 Section 7.0 reporting requirements, PMOC's review findings, comments, conclusions and recommendations are presented in this report and in two appendices titled:

- Appendix B: OP 38 APPENDIX B: Vehicle Technical Review Checklist – Grantee Compliance
- Appendix C: Technical Specification Review Summary

4.0 OVERVIEW OF RAIL VEHICLE PROCUREMENT DOCUMENTS

Per Sections 4.5.1 and 4.6.2 of the CSC Technical Specifications:

> *"The vehicles will be of a light metro type. Each vehicle will be high floor to allow level boarding from high-level station platforms. Vehicles will be of two types, end cars and middle cars. These cars shall be capable of being semi-permanently coupled into multi-car consists to form one single operating train set or consist. Passage between cars will be via wide gangways, full width designs being preferred so as to provide clear sightlines throughout the consist. The vehicle train sets will be bi-directional and fully automated. The maximum train set will be 240 feet, the planned length for station platforms. Vehicles will be fully compliant with the American with Disabilities Act (ADA)."*
>
> *"Vehicle supply responsibilities will include: A) Design, manufacture, deliver, test and commission sufficient light metro vehicles for a peak capacity of 7,200 pphpd for the final O&M period starting in 2024, 8,100 pphpd in 2030 with an ultimate capacity of 12,150 pphpd; B) Provide all bench test equipment, special tools and manuals to maintain the vehicle; C) Provide the parts and labor to satisfactorily maintain the vehicles during construction and operation of the various segments of the system for a 5 yr O&M period with a five year optional O&M period; and D) Coordinate with the Design-Builder of the MSF, who is responsible for the shop design and its heavy equipment to assure compatibility with the vehicle and with maintenance procedures and protocols".*

The vehicle related portions of the CSC RFP and BAFO are primarily composed of the following major sections:

- General Conditions for Design Build – Provides "standard" The grantee procurement contract provisions.
- Design Criteria, Section 12, dated October 2010 – Describes minimal and desired features and performance of the "Light Metro" rail vehicles for the Project.
- Technical Provisions, TP 2, Verification Test and Acceptance – Elaborates on all tests and acceptance provisions for the CSC contract, inclusive of the rail vehicles.
- Technical Provisions, TP 4, Passenger Vehicle Technical Provisions – Provides comprehensive detail of the vehicles and subsystems to be procured as well as performance criteria, clearances, support, etc.
- Special Provisions, 2a-SP-1.6, Federal Standards – Includes appropriate Federal Standards applicable to the vehicle procurement including ADA, Buy America, etc.
- Special Provisions, SP 1-7 BAFO, dated December 2010 – Provides detail as to specific procurement and administrative requirements for the CSC contract.
- Requests for Clarification, BAFO, dated December 2010 – Lists requests for clarification and grantee responses as part of the BAFO.
- AnsaldoHonoluluJV BAFO2, Proposed Vehicle, Sections 1 through 13 – Provides details of the vehicles and subsystems to be provided by the selected CSC contractor (AHJV).
- AnsaldoHonoluluJV Design Build Price Proposal, Section B, dated February 24, 2011 – Provides line item pricing for the CSC contract including vehicle related line items.

5.0 PMOC REVIEW FINDINGS

The CSC RFP submittal is the first formal rail vehicle submittal for the Project to be reviewed by the PMOC. As such, the PMOC's review focused on the following objectives:

(1) To assess whether the vehicles being procured are a good fit for the intended use, represent good value for the product selected, meet the specified requirements, and include appropriate technologies.

(2) To ensure that vehicle procurement is performed in conformance with applicable regulations and guidance to meet vehicle program requirements.

(3) To determine whether the CSC RFP and the vehicle portion of Ansaldo BAFO are satisfactory for the proposed Project.

This RFP document is comprehensive and structured for accessing specifications & referencing of materials necessary for delivery of an acceptable rail vehicle. The content, while placed within numerous sub-documents within the RFP package, provides the necessary information related to t grantee's commercial terms & conditions, procurement process, and vehicle requirements.

The PMOC reviewed the Technical Specifications and supporting documents to identify any requirements that lack clarity, or that could drive up costs, limit competition, or affect viability of specification in terms of being biddable.

The vehicle portion of CSC RFP document is comprehensive and is structured for the ready accessing and referencing of operational and material requirements for the desired performance of the vehicle and sub-systems. The content provides the necessary information related to the grantee's commercial terms and conditions, Federal Regulations, procurement process, and vehicle technical requirements and standards. The PMOC's review of the technical specifications (summarized in Appendix C) found that they were comprehensive and satisfactory in addressing the rail vehicle requirements.

Technical Specifications and supporting documents satisfactorily address all technical elements for the rail vehicles, such as overall vehicle requirements, carbody, trucks & suspension, propulsion system, brake system, couplers, passenger accommodations, lighting, doors, HVAC, signage and communication, electrical/electronic/data communication systems, etc.

It should be noted that the PMOC has not been privy to the details of evaluation factors / ranking / rating and, therefore, cannot comment on the evaluation and selection procedure or ultimate selection decision. The grantee has agreed to provide the PMOC the grantee's detailed evaluation procedure for further review to assess comprehensiveness of the process. In addition, the unsuccessful proposers had filed protests for the CSC contract award to Ansaldo, which were resolved in the grantee's favor. The grantee is now proceeding with the contract execution with Ansaldo.

Also, due to the nature of various elements of this CSC DBOM contract, much of the management processes within the CSC and of the vehicle procurement is covered within the general management provisions and "*Plan Requirements*" within the RFP Special Provisions. In

order to assure timely delivery of vehicles with the specified performance and the highest reliability & quality for the revenue service, it will be critical for the grantee to follow a disciplined and comprehensive management approach in its oversight of the CSC contract. Management of the design process, manufacturing quality, testing, delivery, and commissioning in particular will be crucial to the success of a contract as expansive and complex as the CSC. In addition, the requirements for quality, training, warranty, and manuals have been addressed within the broad terms of the CSC contract and will need particular scrutiny by the grantee, should the planned Operations and Maintenance contract circumstances change.

It is PMOC's opinion that this Rail Vehicle Procurement Package is acceptable as a deliverable in regard to the grantee's entry into Final Design, and that it meets the requirements of FTA OP 38, Sections 1.0 Purpose and 3.0 Objectives:

- The vehicles being procured are a good fit for the intended use and include appropriate technologies.
- The procurement is being performed in conformance with applicable regulations and guidance.

While the information presented is acceptable as a deliverable for the grantee to enter into Final Design, PMOC's review offers several findings and comments on the grantee's RFP as well as on Ansaldo's BAFO. PMOC's review findings and comments on the grantee's RFP and the grantee's subsequent response are summarized below:

(1) Based on the schedule provided by the CSC in the BAFO, it is PMOC's opinion that the schedule requirement of the Arrival of 1st train (NTP+26 months), Dynamic testing duration (NTP+27.5-29.5 months) and driverless testing duration (NTP+30 months) is aggressive and poses a potential schedule risk, regardless of the supplier. Delivery of a new vehicle in 26 months (unless it is "vanilla copy" of an existing vehicle) has posed major challenges to most carbuilders. Also, 3-month duration to perform all dynamic & qualification tests is too short.

However, upon further review of the schedule provided by the CSC in BAFO II that accounts for 36 months after NTP for delivery of first train set including additional time for testing, the PMOC concurs that it will be adequate for the CSC to meet. The grantee also agreed to provide the schedule update when the baseline schedule is approved.

(2) While spare parts will initially be a responsibility of the CSC, the grantee should take the time throughout the revenue service phase of the project to observe spare parts methodologies and ensure preparedness, if and when operations and/or maintenance are taken over locally by the grantee.

The grantee concurred and will observe CSC for first 5 years and be ready to take over O&M if optional O&M period is not exercised.

(3) Utilizing an aluminum carbody in the Honolulu climate may not be in the grantee's long-term best interests, as there are many other specification requirements for

stainless steel (e.g. TP-4.7.1.6 and 4.7.4.3 – under floors to be stainless). The PMOC acknowledged grantee's response that TP 4.7.1.6 and 4.7.4.3 will be changed to eliminate SST for Aluminum carbody design and that the SST requirement is for floor burn-through test on carbody for older carbon steel designs.

(4) The PMOC concurs with the grantee's decision that dropping the on-board energy storage provision is prudent.

(5) TP-12.8.10 (and TP-4.3.3) – The PMOC questions the requirements for the top speed of 65 MPH and balancing speed of 68 MPH when top operating speed is stated to be at 55 MPH. This will put additional design demands on propulsion and braking system equipment.

The grantee concurred with PMOC's comment and will change it to 55 MPH.

(6) TP-12.8.12 – Average annual mileage for vehicles is stated to be 63,500, while the RFMP indicates about 100,000 miles per year per vehicle. This inconsistency should be resolved.

The PMOC acknowledged grantee's response that as stated in the Rail Fleet Management Plan, the grantee will rebuild in 5 yrs or 500,000 miles and the mileage stated in TP is an average to be used by the CSC in life cycle costing.

(7) General: There do not appear to be any requirements for vehicle interior or underfloor mock-ups or prototypes. On most recent vehicle procurements, transit agencies have found the mockups and prototypes to be useful tools and means for reviewing and for validating the design in such critical areas as passenger comfort, ADA accessibility, maintainability, etc. before the vehicle production begins, thus minimizing changes. How will the grantee manage this portion of the design process?

The PMOC acknowledged grantee's response that the grantee has decided to keep with a very service proven design with few options to explore; therefore no mockups or prototypes will be necessary.

(8) TP-4.5.6.1 – Mode 4 refers to "Power outage automatic operation …" What operation would occur without power (without on board energy storage)?

The grantee concurred with PMOC's comment and will eliminate the requirement from the TP.

(9) TP-4.5.7 – Statement requires transmission of "35 Mbps over entire system at 65 MPH"; why is this a requirement and how will it be test-verified?

The grantee concurred with PMOC's comment and will eliminate the requirement from the TP.

(10) TP-4.6.4 – There appears to be no provision for gangway end anti-climbers; is there another provision to prevent telescoping of adjoining vehicles upon collision?

The grantee responded that the drawbar connection performs this function. The PMOC disagrees with grantee's response because it is not clear how telescoping will be prevented without an anticlimber. However, this is a detailed design issue that can be readily resolved during the design review process.

(11) TP-4.6.4 – States that "secondary, truck-mounted lifeguards" are required, while TP-4.7.5.3 states that truck lifeguards are not required. This inconsistency should be resolved.

The grantee concurred with PMOC's comment and responded that TP 4.7.5.3 is correct. TP 4.6.4 will be corrected through the change notice process.

PMOC's review findings and comments on Ansaldo's BAFO and the grantee's response are summarized below:

(1) The selected CSC contractor, Ansaldo, is supplying 80 vehicles to meet demand as required by the grantee in the RFP, at a total cost of $180.1 million. It is not clear from the price proposals if the vehicle price includes all ATC and communications costs associated with the vehicles.

No response was provided. However, this can be readily verified during the workshop meeting with the grantee.

(2) Under the vehicle procurement portion of the BAFO submittal, no middle "M" vehicles are being supplied, so any trains of more than two cars will have to be four car trains consisting of four end "E" cars. It is not clear if the grantee has accepted this approach to be the final arrangement for train consists and how it will affect Peak Vehicle Requirements needs in the future years.

The PMOC acknowledged grantee's response that the grantee plans to procure ten additional railcars in FY 2024, since Ansaldo is not providing any middle "M" vehicles. The grantee added that the Project's Draft Financial Plan for Entry into Final Design discusses the expectation of procuring ten additional railcars in FY 2024.

(3) AnsaldoBreda does not appear to have much flexibility to increase the U.S. content because three major components Carbody, Propulsion (partial) and Auxiliary Electric (partial) will be made in Italy as it has typically done on other U.S. projects. A Pre-Award Buy America audit by the grantee should be comprehensive and perform in-depth scrutiny of potentially liberal interpretation of Buy America regulations by AnsaldoBreda.

Upon presentation by the grantee to the PMOC of AnsaldoBreda's most current Buy America projection that shows domestic content of approximately 67%, the PMOC acknowledges that AnsaldoBreda is more than compliant with the minimum 60% required by the Buy America regulation. A draft report of the Pre-Award Buy America Audit is being prepared by the grantee and will be issued to FTA.

(4) In order to ensure timely delivery, the grantee and its staff will need to be prepared to expend additional time and effort throughout the procurement, paying particular attention to the design review process, testing through the Verification Testing and Acceptance (VTA) Plan, CDRL progress and First Article Inspections (FAI). The grantee should especially pay close attention to managing the design schedule while maintaining manufacturing and delivery schedule. In addition, while quality assurance is a major requirement within the CSC contract, the grantee will need to be diligent in monitoring and managing AB's quality program and processes.

The grantee concurred with PMOC's comment and responded that it will develop a commercial strategy to address the issues mentioned relating to schedule. Reliability of major systems will also be closely evaluated to meet contract reliability requirements.

(5) Several key U.S. suppliers for vehicle systems have not yet been selected or identified (or have only been tentatively identified); others have never been integrated before into a vehicle design of this configuration by AnsaldoBreda. While this risk is borne by the CSC Ansaldo, it is still an overall risk to the project and to the grantee. The PMOC accepts that the basic vehicle design is "service-proven" from another existing transit property, but it is evident from the BAFO that the proposed vehicle is not an "off-the-shelf" vehicle and will require several design changes and/or new design elements to accommodate U.S. suppliers' equipment. The grantee will need to closely monitor these suppliers' designs and how they are integrated into the overall vehicle design and qualified vehicle.

The grantee concurred with PMOC's comment and responded that new system and subsystem integration will be monitored closely during the preliminary design review (PDR) such that any problems or issues will flush out early. Also, the grantee will handle new designs required for this project on a case by case basis during the PDR process.

(6) AnsaldoBreda has claimed that it can meet or exceed vehicle reliability and maintainability requirements as defined in the RFP; however, AB has not provided any substantiating data from existing operations for the subsystems defined. As such, this remains an unknown risk for the grantee and the project; this presents another area where the grantee must do due diligence to ensure successful operation once in revenue service, despite the performance clauses in Ansaldo's O&M agreement.

The grantee concurred with PMOC's comment and responded that reliability of vehicle systems and subsystems will be verified during the design and submittal

review process since AnsaldoBreda has contractually signed up for reliability as specified in the Technical Provisions.

(7) Ansaldo's proposal of a single Maintenance and Recovery Vehicle (MRV) may pose additional challenges in revenue operation; should the power be lost for a significant time on any portion the service line(s), having only one such vehicle could negatively impact recovery. A single MRV could be in heavy use for wayside maintenance at the time of need for recovery or perhaps out of service itself for repairs or damage.

The grantee acknowledged PMOC's comment and responded that it is studying the use of wayside generators to provide backup power to overcome lengthy power outages.

(8) AnsaldoBreda's planned derailment mitigation device is only proven on Copenhagen system, which has different criteria and conditions from the Honolulu project.

No response was provided. However, this is a detailed design issue that can be readily resolved during the design review process.

Additionally, upon NTP to the CSC and in order to fully conclude PMOC's scope of work obligations as stated in FTA OP 38, the PMOC recommends the following:

- Perform a follow-up review of the grantee's evaluation factors/ranking/rating of the vehicle manufacturer proposals to determine if reasonable and equitable decisions concerning the vehicles indeed represent good value for the product selected and meet specified requirements.
- Review the decision and final disposition of the protests for the CSC.
- Monitor the CSC/Vehicle procurement process to assess and assist the grantee in conducting this program in a timely manner.

6.0 CONCLUSION

In summary, the PMOC recommends that the Rail Vehicle Procurement Package be accepted as Final Design deliverable.

The PMOC recommends that upon the NTP to CSC, and through the vehicle contract design & procurement process, the grantee provide a satisfactory resolution of PMOC's comments expressed in this Report and Appendix B titled OP 38 Appendix B, Rail Vehicle Technical Review Checklist – Grantee Compliance, for a follow-up review by the PMOC.

7.0 APPENDICES

Appendix A: Acronyms

AB	▪	AnaldoBreda
ADA	▪	Americans with Disabilities Act
AHJV	▪	Ansaldo Honolulu Joint Venture
APTA	▪	American Public Transportation Association
ATC	▪	Automatic Train Control
BAFO	▪	Best and Final Offer
CDRL	▪	Contract Documents Requirements List
CFR	▪	Code of Federal Regulations
CSC	▪	Core Systems Contractor
DB	▪	Design Build
DBOM	▪	Design Build Operate Maintain
DOT	▪	Department of Transportation
FAI	▪	First Article Inspection
FD	▪	Final Design
FRA	▪	Federal Railroad Administration
FTA	▪	Federal Transportation Administration
HHCTCP	▪	Honolulu High Capacity Transit Corridor Project
MRV	▪	Maintenance and Recovery Vehicle
MSF	▪	Maintenance & Storage Facility
NTP	▪	Notice to Proceed
O&M	▪	Operations and Maintenance
OP	▪	Oversight Procedure
PDR	▪	Preliminary Design Review
PMOC	▪	Project Management Oversight Contractor
Pphpd	▪	Passengers per hour per direction
PVR	▪	Peak Vehicle Requirements
QA	▪	Quality Assurance
QC	▪	Quality Control
RFMP	▪	Rail Fleet Management Plan
RFP	▪	Request for Proposal
TCC	▪	Technical Capacity and Capability
TP	▪	Technical Provision
US/U.S.	▪	United States
VTA	▪	Verification Testing and Acceptance

Appendix B: OP 38 APPENDIX B: Vehicle Technical Review Checklist – Grantee Compliance

Section No.		OP 38 Scope of Work Item	Grantee Compliance
6.0		In performance of the reviews below, following the checklist in Appendix B, the PMOC should report discrepancies and make suggestions for correction as appropriate. The PMOC should then follow up and report on the corrective actions taken by Grantee. The PMOC should pay particular attention to the following issues:	
		• Schedule, issues potentially impacting schedule, and issues actually impacting schedule;	***Acceptable at this time.*** Other than existing protests by unsuccessful proposers, there are no concrete issues at this time. (See comments concerning schedule risk in the report body). Schedule adherence should be monitored throughout contract execution.
		• Vehicle safety issues;	***Acceptable at this time.*** Vehicle safety-related issues should be monitored throughout the contract design and safety certification phases.
		• Vehicle reliability, availability and maintainability;	***Acceptable at this time.*** A VTA Plan is to be developed; vehicle reliability, availability and maintainability should be monitored throughout the contract design and testing phases. See comments concerning reliability and maintainability in the report body.
		• Issues impacting vehicle operability;	***Acceptable at this time.*** Selection and integration of vehicle subsystems will be part of the design process; vehicle operability issues should be monitored throughout the design as well as testing phases.
		• Faulty or unreliable vehicle designs or systems;	***Acceptable at this time.*** Selection and integration of vehicle subsystems will be part of the design process; vehicle operability issues should be monitored throughout the design as well as testing phases.
		• Known component or material deficiencies and availability of replacement parts;	***Acceptable at this time.*** Potential component or material deficiencies should be monitored throughout the contract design and testing phases.
		• Other, such as payments to vendors (slow or no payments)	***Acceptable at this time.*** Payments to vendors should be monitored throughout contract execution.

Section No.		OP 38 Scope of Work Item	Grantee Compliance
6.1		**Environmental Documents:** The PMOC shall confirm that the intended vehicle does not potentially conflict with statements in the environmental documents. Describe any conflicts between environmental documents and intended vehicle and Grantee's intended response.	***Acceptable at this time.*** The proposed vehicle is consistent with that described in the FEIS.
6.2		**Project Description/Grant Application:**	
	1	The PMOC shall consider how well the proposed vehicle fulfills the Grantee's stated purpose of the project and complies with applicable statutes and regulations. Describe discrepancies between intended vehicle and needs described in Project Description and Grant Application;	The proposed vehicle fulfills the Project's intended purpose and complies with applicable regulations.
	2	Does the vehicle fulfill the operational needs;	Yes, based on PMOC's review.
	3	Will the maintainable intended vehicle fit the budget;	Yes, based on other supplemental documentation made available to the PMOC.
	4	Is the vehicle by the Grantee within the resources available;	Yes, based on other supplemental documentation made available to the PMOC.
	5	Will additional vehicles be required and if so has the process taken follow-on procurements into account;	The PMOC reviewed the fleet requirements information in the RFMP Table 4-7 that shows 80 vehicles will be adequate for the first ten years of revenue service; and the PMOC concurs with the grantee's analysis.
6.3		**Specification: Review draft specification and the final specification to answer the following questions:**	
	1	Does the intended vehicle meet the environmental document requirements;	Yes. Necessary tests and verifications are specified to ensure compliance with system environmental requirements.
	2	Do the payment schedule and the work schedule match;	Yes.
	3	Will key technical documents will be approved before hardware delivery;	Yes, per management plans required of the CSC.
	4	Can the vehicles be maintained with the resources at the Grantee's disposal;	Yes, the grantee is implementing a DBOM contract where maintenance of vehicles is part of CSC's maintenance requirement for several years after the start of the revenue service.
	5	Will the vehicles meet the Grantee's operational requirements;	Yes, based on PMOC's review.
	6	Will the training program enable the Grantee to perform vehicle operations and maintenance;	Yes, the grantee is implementing a DBOM contract where training is part of CSC's maintenance requirement for several years after the start of the revenue service.

Section No.		OP 38 Scope of Work Item	Grantee Compliance
	7	Do the qualification and acceptance criteria ensure the vehicles "as delivered" will meet the Grantee's needs within acceptable boundaries without having to repeat qualification tests;	Yes, per management plans required of the CSC.
	8	Are project technical issues being resolved/mitigated; open items resolved prior to next payment;	***Not Applicable for this review.***
	9	Does the payment schedule (in particular front-loaded payment schedule) adequately leverage compliance with specifications; does it ensure the Grantee holds sufficient retainage at PDR, FDR, FAI, Performance Testing, Vehicle Acceptance, and the warrantee period for supplier and sub-suppliers;	Yes, in the context of inclusion within the larger CSC contract. However, details of payment schedules for the entire CSC contract have yet to be determined or analyzed.
	10	Does the schedule include delivery of "as built" drawings;	Yes, as defined in management portions of the overall CSC contract.
6.4		**Contract Deliverables Requirements List (CDRL):**	***Not Applicable for this review.*** CSC vehicle contractor will develop CDRL during contract execution, as part of the management plans required for the contract. Upon FTA's approval, the PMOC can provide oversight of the grantee's contract management for review of all of the items listed below in 6.4.
	1	Does the CDRL assure that all critical performance issues are adequately analyzed, including:	See above comment in 6.4.
	2	Structural strength and fatigue resistance of Body and Truck;	See above comment in 6.4.
	3	Brake Performance;	See above comment in 6.4.
	4	Propulsion performance;	See above comment in 6.4.
	5	Dynamic performance;	See above comment in 6.4.
	6	HVAC performance;	See above comment in 6.4.
	7	Dynamic Envelope, loading gauge, and clearance requirements;	See above comment in 6.4.
	8	Controls and Interlocks;	See above comment in 6.4.
	9	Weight Management;	See above comment in 6.4.
	10	Safety Management;	See above comment in 6.4.
	11	Reliability Management;	See above comment in 6.4.
	12	Availability Management;	See above comment in 6.4.
	13	Maintainability and Mean Time To Repair	See above comment in 6.4.
	14	Does the CDRL schedule assure that performance is proved by analysis before start of sub-assembly production	See above comment in 6.4.
6.5		**Test Program Plan and Procedures**	***Not Applicable for this review.*** CSC vehicle contractor will develop a Verification Testing and Acceptance (VTA) Plan during contract execution, as part of the management plans required for the contract. Upon FTA's approval, the PMOC can provide oversight of the grantee's contract management for review of all of the items listed below in 6.5.

Section No.		OP 38 Scope of Work Item	Grantee Compliance
	1	Are critical specified performance criteria demonstrated by test, by acceptable analysis, or prior agency certified test;	See above comment in 6.5.
	2	Are acceptance tests sufficient to demonstrate that each vehicle is compliant through testing of representative criteria;	See above comment in 6.5.
	3	Is the test program valid for the vehicle and the intended infrastructure; for instance, are new vehicle designs on new infrastructure treated to a different approach (a full system test for example), than existing vehicle designs; existing vehicle designs previously tested on the existing infrastructure might only require vehicle testing to assure satisfactory interfacing with the existing infrastructure;	See above comment in 6.5.
	4	Are waivers for existing designs evaluated fully to ensure that the waivers are based on proven in-service technology used in demonstrably similar systems;	See above comment in 6.5.
	5	Do test procedures refer to applicable sections of the specification;	See above comment in 6.5.
	6	Are test procedures up-to-date and do they reflect the latest design configurations;	See above comment in 6.5.
	7	Will the test plan validate all analyses;	See above comment in 6.5.
	8	Will the test plan validate performance that has not been analyzed;	See above comment in 6.5.
	9	Will the acceptance testing proposed validate production results and fleet performance;	See above comment in 6.5.
	10	Does the test plan and CDRL ensure the vehicle will perform on the actual infrastructure;	See above comment in 6.5.
6.6		**Design Documents. Review documents to ensure:**	***Not Applicable for this review.*** The RFP describes design review process. But, the contract has not yet been awarded and the design process has not yet begun. Upon FTA's approval, the PMOC can provide oversight of the grantee's contract management for review of all of the items listed below in 6.6.
	1	Do the documents address the intended issues;	See above comment in 6.6.
	2	Is there a properly sequenced and efficient plan of design to ensure compliance and mitigate against rework;	See above comment in 6.6.
	3	Assumptions made are valid and proven;	See above comment in 6.6.
	4	Analytical methods meet current professional standards;	See above comment in 6.6.
	5	The Grantee's review is by persons competent in the field and capable of detecting and commenting on design and analytical errors;	See above comment in 6.6.

Section No.		OP 38 Scope of Work Item	Grantee Compliance
	6	Drawing and configuration control are designed to ensure consistency throughout the fleet, including option orders;	See above comment in 6.6.
	7	Is PDR consistent with the specification;	See above comment in 6.6.
	8	Is FDR consistent with specification, with all issues of design and analysis closed;	See above comment in 6.6.
	9	Does the FAI validate all items of production;	See above comment in 6.6.
	10	Are the performance tests a full validation of the vehicle performance;	See above comment in 6.6.
	11	Does vehicle acceptance validate the fleet performance within acceptable tolerances;	See above comment in 6.6.
	12	Does analysis and test precede production to minimize changes after production has started;	See above comment in 6.6.
6.7		**Quality Assurance. Review the Grantee's QA plan to assure:**	***Not Applicable for this review.*** The RFP describes quality monitoring process, including a Quality Plan. But, the contract has not yet been awarded. Upon FTA's approval, the PMOC can provide oversight of the grantee's contract management for review of all of the items listed below in 6.7.
	1	Do the supplier's QA program and the Grantee's oversight ensure delivery of the vehicle "as designed";	See above comment in 6.7.
	2	Does the Grantee have qualified inspector(s) on site during manufacturing, including during pre-production of jigs and fixtures;	See above comment in 6.7.
	3	Do the Grantee and Supplier reporting relationships provide sufficient independence to allow issues to be raised;	See above comment in 6.7.
	4	Are protocols in place for dealing with discrepant materials, to quarantine such materials before proper disposal; does the Grantee's inspector have a voice in disposal of discrepant materials;	See above comment in 6.7.
	5	Is the schedule such that choices between corrective action and meeting the schedule do not drive compromise vehicle quality.	See above comment in 6.7.

Appendix C: Technical Specification Review Summary

Section No.	Technical Specification Requirement	PMOC Review Comment	Requirement Satisfied
TP-4.3	Vehicle General Requirements	Key items such as service life, duty cycle, maximum operating speed, and average annual mileage and unit standards are specified.	✓
TP-4.4	Vehicle General Characteristics	Key items such as vehicle type, passenger doors & seating, multi-purpose area, vehicle identification, and weights & capacities are specified.	✓
TP-4.5	System Interfaces	Key items such as critical vehicle dimensions, wheel/rail interface, platform height/clearance, ATC, WLAN/HSDL interface, and maintenance interfaces are specified.	✓
TP-4.6	Vehicle Performance	Key environmental and ergonomic items such as climate, performance, illumination levels, ride quality, noise, shock & vibration, HVAC, crashworthiness/strength, general reliability & maintainability, aesthetics, multiple-unit operation, and safety and passenger interfaces & loading are defined.	✓
TP-4.7.1	Vehicle Body	Key items such as compliance with ADA, finite element analysis, floor and roof construction, strength requirements, water tightness, and corrosion protection are specified.	✓
TP-4.7.2	Couplers	Key items such mechanical and electrical coupling details, automatic operation, energy absorption, and centering requirements are specified.	✓
TP-4.7.3	Gangways	Key items such as bellows and (flooring) bridge plates are specified.	✓
TP-4.7.4	Interior	Key items such as flammability & toxicity, fit & function, color schemes, fastening, seating, handrails, flooring, graphics, window glazing, wall & ceiling materials, and insulation are specified.	✓
TP-4.7.5	Exterior	Key items such as external equipment, truck lifeguards, body skirts, and windshield wipers/washers are specified.	✓
TP-4.7.6	Keys & Locks	Keys and locks are specified.	✓
TP-4.7.7	Control & Trainlines	Key items such as hostler panel, isolation controls, master controller, train lines, and interlocks are specified.	✓
TP-4.7.8	Passenger Doors	Key items such as door leaf, operator & control, obstruction detection, interlocks, manual & emergency releases, warning devices and crew access are specified.	✓
TP-4.7.9	HVAC	Key items such as unit description, fresh air requirements, air filtration and distribution, temperature requirements, and refrigerant body design are specified.	✓
TP-4.7.10	Lighting	Key items such interior and emergency lighting, headlights, taillights/stoplights, marker lights, and fault indicator lights are specified.	✓

Section No.	Technical Specification Requirement	PMOC Review Comment	Requirement Satisfied
TP-4.7.11	High Voltage Power	Key items such as third rail shoe gear, shop power interface, over voltage protection, line filters, and high voltage protection are specified.	✓
TP-4.7.12	Grounding	Key items such as power return protection, ground brushes, and safety grounding are specified.	✓
TP-4.7.13	Auxiliary Power	Key items such as auxiliary invertors, load management, auxiliary shop power, and convenience outlets are specified.	✓
TP-4.7.14	Low Voltage Power	Key items such as low voltage distribution, battery, & battery charger are specified.	✓
TP-4.7.15	Propulsion	Key items such as propulsion invertors, motors, controls, speed regulation, spin-slide, load compensation, roll-back, and fault protection are specified.	✓
TP-4.7.16	Dynamic Braking	Key items such as dynamic braking/regeneration, traction motor detail, and gearboxes are specified.	✓
TP-4.7.17	Trucks & Running Gear	Key items such as truck construction, lifting points, attachment to carbody, wheel truing, suspension, load leveling and suspension details, wheels, axles, flange lubrication, track brakes, and other running gear are specified.	✓
TP-4.7.18	Friction Braking	Key items such as service & emergency braking requirements, park brake, sanding equipment, blended braking, slide control, jerk limiting, and degrading running are specified.	✓
TP-4.7.19	Automatic Train Control	Manual mode is specified. Reference to ATC portion of the CSC specification.	✓
TP-4.7.20	Video Monitoring & Communications	Key items such as external and internal cameras, recording equipment, data communications, voice communications, WLAN, communications train lines, GPS/AVL, public address, passenger information, and emergency communications are specified.	✓
TP-4.7.21	Automatic Passenger Counters	APC system and methods required are specified.	✓
TP-4.7.22	Event Recorder	Event recorder system and required data collection are specified.	✓
TP-4.7.23	Monitoring & Diagnostic System (MDS)	Key items such as system description, interface requirements, control station display, required fault monitoring, screens, and troubleshooting capabilities are specified.	✓